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ABSTRACT

Distance education reverses the traditional way of providing education to the learning community. Instead of students coming to the university to get that needed education, the university comes to the student. This research/survey of undergraduate engineering distance learning universities was conducted utilizing traditional and virtual sources of information. Various university Web sites were visited. Where information was scarce and/or needed verification, library resources were consulted. The study provided an overview of how distance education is being practiced in universities worldwide, with particular attention to universities in North America. Technologies for access and interactivity, quality of learning, and accreditation are discussed. A table lists collaborative agencies and member universities offering engineering distance learning, worldwide distance learning universities in engineering, and undergraduate distance learning universities in the United States. (AEF)

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Paper Session

Engineering Undergraduate Distance Learning Programs: An Assessment

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Key Words: engineering distance learning, distance learning collaboration, accreditation, distance learning technology, quality of learning

Abstract

This particular research/survey of undergraduate engineering distance learning universities was conducted utilizing traditional and virtual sources of information. Various university Web sites were visited. Where information was scarce and/or needed verification, library resources were consulted. The study provided an overview of how distance education is being practiced in universities worldwide, with particular attention to universities in North America. Technologies for access and interactivity, quality of learning, and accreditation are discussed.

Introduction

Distance education reverses the traditional way of providing education to the learning community. Instead of students coming to the university to get that needed education, the university instead comes to the student. Differing thoughts and issues about distance learning abound.

> *Distance education is a movement that sought not to challenge or change the structure of higher learning but a movement to extend the traditional university, a movement to overcome its inherent problems of scarcity and exclusivity. (Hall, 1996)*

> *The percentage of 25–34-year-olds enrolled as college undergraduates increased by 33% and in the even shorter period between 1976–1994 the percentage of undergraduates age 35 and older also increased by 33% (Occupational Outlook Quarterly, 1996). This older*

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> *population, engorged by the baby boomer bubble and the need to train and retrain a workforce to deal with the rapidly changing workplace requirements altogether create a big market for the delivery of postsecondary education through distance learning. (Goldstein, 1991)*
>
> *Information technology and network developments appear to push us in two seemingly opposite directions: In the one case, toward a more open, unbounded (and unregulated) enterprise; in the other toward more collaboration and partnering.*
>
> *Distance education has itself suffered from shortcomings and scarcities that have made it difficult to operate, expensive to develop, and occasionally difficult to validate. (Hall, 1995)*
>
> *Distance education will be commonplace in the future. (Educom Review, 1997)*

While 40% of competitive improvements are derived from direct investments, 60% of competitive advantage comes from advances in knowledge or innovation (Carnevale, 1992). Innovation complements science and invention with constant improvements (Carnevale, 1992). A lot of modern conveniences, such as the automobile, and progress in industry, e.g., in the telecommunications industry, are products of continuous innovation that is happening in the field of science/technology and engineering.

The rapidly changing field of engineering makes engineers critically dependent on keeping abreast with new developments (Moore & Kearsley, 1996). Innovation can happen when the workforce is in a constant cycle of learning, relearning, and cumulative learning. Adult education provides an opportunity for those employed to keep pace with rapid changes in the workplace. Participation rates indicate the importance of lifelong learning as a condition of employment in the future labor force. In 1995, 21% of all adults participated in work-related adult education. The majority comprising this percentage took courses provided by businesses or professional organizations. Others were provided by colleges and universities or government agencies. Workers in the executive, professional, and technical occupations were most likely to receive on-the-job training. Distance education is able to address this critical learning need in the field of science and engineering.

Distance Learning Cooperative Movements in Engineering Higher Education

The latter half of the 1980s and the early 1990s saw the emergence of many distance learning consortia based on satellite television and the large industry of "business TV" delivered by satellite (Moore & Kearsley, 1996). Two advantages that are attributed to consortia-delivered distance education are its capability to offer a broad selection of courses and the strong competition that exists among the member universities in terms of offering the best-quality courses in the most timely manner. The customer's (students, employees, companies) needs dictate what courses are in demand and marketable (Moore & Kearsley, 1996). In this paper, four engineering

distance education consortia partnerships are discussed.

The National Technological University (NTU)

Established in 1985 and based in Fort Collins, Colorado, the accredited National Technological University (NTU) is a cooperative effort of 47 universities (Table 1) providing for graduate and continuing education for the busy engineer, technical professional, and manager. NTU has no faculty or campus of its own but relies on courses taught by faculty of participating teaching universities. Through satellite communication and compressed digital video, these universities are linked together and relayed to more than 1,000 work locations internationally. With internal connections to other regional networks these universities are linked to 350 sites in North America. Courses are uplinked to NTU by satellite from the originating university and then NTU redistributes these courses to the various sites by satellite. By means of instructional television, engineers, scientists, and managers at their job sites can tune in to technical and managerial courses offered by top faculty and experts at the nation's leading engineering schools and other organizations and institutions selected because of their special expertise. During 1996–97 these practicing professionals chose from more than 500 academic courses providing 22,000 hours of instruction, plus another 500 days, or 3,000 hours, of continuing education. Enrollment during the 1996–97 school year was 110,000, with 1,300 working professionals and managers.

The National Universities Degree Consortium (NUDC)

The National Universities Degree Consortium (NUDC) (Table 1) is a consortium of 13 accredited universities across the United States working together to offer more than 1,000 courses, three credit certificates, 11 bachelor degrees, and 24 graduate degrees through distance education. Through the NUDC each individual member of the consortium offers courses through a variety of distance education formats. A few of the institutions offer external degree-completion programs. Students can choose from a wide variety of coursework offered by all the members to complete the degree program of a particular institution. Member institutions develop and manage the operations of the consortium and ensure high-quality programs with the ultimate goal of providing university credit courses leading toward external degrees. Engineering programs are at the master's level and are offered in three of the consortium member universities: Colorado State University, University of Idaho, and University of Alabama. Colorado State University is a member institution of both NTU and NUDC.

Southeastern University and College Coalition for Engineering Education (SUCCEED)

Funded by the National Science Foundation with matching funding provided by participating institutions, the Southeastern University and College Coalition for Engineering Education (SUCCEED) (Table 1) is a coalition of eight southeastern engineering colleges managed in the College of Engineering at North Carolina State University. It is committed to a comprehensive revitalization of undergraduate engineering education through its four major components. SUCCEED's curriculum model, called CURRICULUM 21, conveys the coalition's theme: Engineering

Education for the 21st Century. This model aims to address the need to develop a new type of engineer who will be a multifaceted, technically competent integrator and problem solver who can interface with technical and other specialists in cross-functional team approaches to product innovation, development, and production process. CURRICULUM 21 consists of three interrelated learning stages for students: an integrated engineering core, an engineering design and process core, and a functional engineering core. With respect to engineering curriculum, SUCCEED promises to develop a process engineering degree program that is an integrated combination of traditional related engineering knowledge coupled with process engineering specific content. SUCCEED will also develop a multidisciplinary Bachelor of Science in engineering degree with a new disciplinary designation to meet the growing integrated engineering and management needs of the industry.

The Florida Engineering Educational Delivery System (FEEDS)

The Florida Engineering Education Delivery System (FEEDS) was established by the Florida legislature in 1982 to deliver graduate engineering education, primarily at the master's level, to engineers throughout the state at their place of work through distance learning technologies. FEEDS operates as a technology-based delivery system. It is a cooperative effort of the State University System and private-sector industries located within the state of Florida. The colleges of engineering at the Florida Agricultural and Mechanical University/Florida State University, Florida Atlantic University, Florida International University, University of Central Florida, University of Florida, and University of South Florida originate graduate courses and programs as primary centers for the delivery system. The University of North Florida and the University of West Florida, along with numerous industrial partners throughout the state, participate in the delivery of graduate engineering programs as cooperating centers.

Summary of Distance Learning in Engineering

Six universities are members of NTU and NUDC: Colorado State University, Kansas State University, University of Alabama, University of Maryland/College Park, University of Idaho, and University of South Carolina. NTU/SUCCEED university members are Clemson University, Georgia Institute of Technology, North Carolina State University, University of Florida, and University of Illinois/Urbana Champaign. SUCCEED/FEEDS university members are Florida A&M University, Florida State University, and the University of Florida.

Independently operating distance learning universities offering different certification in engineering, e.g., associate, predegree, degree, diploma, postgraduate, continuing education, certificate, and training, exist worldwide (Table 2). The Peterson's Directory of Distance Learning database revealed 24 universities offering undergraduate distance learning (Table 3). Further exploration revealed that there are other well-established distance learning universities under a different classification in Peterson's Directory.

Technologies Adopted for Distance Learning

Distance education began its life through correspondence utilizing one of the earliest forms of communication, i.e., print, which occurred on an international scale. The origins of some of most important ideas and techniques being used today have their roots in century-old events that occurred globally. Begun as a form of correspondence study, distance education evolved into a total-systems approach pioneered by Charles Wedemeyer, which was adopted by the Open Universities, principally the British Open University. This approach used print, broadcast, and recorded material and was distributed by radio and television.

An *Overseas Development Administration 1995 Education Report* revealed varied perceptions about distance education. The United Kingdom looks at it as a grown market, the United States views it as a second-class option, and developing countries are yet to be convinced of its benefits. The report cited cultural adaptability, attitudes, local point of contact, and student support as factors necessary for its success.

Among the distance learning technologies, the most popularly used is the videotape system (Table 4). A majority of the schools in Table 4 have a video-based system of course delivery. In this system, tapes are sent to students by mail for replay by students at different sites.

Telecourses offer the convenience of taking classes while at home or in the office by way of the student's television set. Brevard, Michigan State, Rochester Institute of Technology, University of Washington, New Jersey Institute of Technology, and New York University utilize the system of telecourses. Online courses facilitate instruction to any student who has a connection to the Internet. This is usually supported by a host of other technologies, such as two-way videoconferencing, live and interactive, and electronic mail. Acadia University in Canada, Brevard Community College, Rennselaer Polytechnic University, University of Houston, University of Washington, University of North Carolina, Stanford University, and University of Central Florida all have an established online-courses distance learning program.

Boston University's interactive-compressed video system utilizes three state-of-the-art PictureTel videoconferencing systems. These systems transmit at speeds of 56–384k (full motion video) capability. Stanford University's Stanford Instructional Television Network (SITN) utilizes digitization and compression of courses in video format, which are stored on a video server, making it available as an on-demand video streaming environment. Michigan State University, North Carolina State University, Oklahoma State University, Old Dominion University, Rennselaer Polytechnic University, University of Houston, and Southern Methodist University utilize the Satellite Broadcast Television System in their course delivery.

Access and Interactivity

Technology is looked to as a means to solve the problems of effectively delivering distance education. Distance education practitioners were the first to see the promise of the technological revolution as a means of unlocking the door of access for students and help distance learning institutions become the leaders of the "New University" (Hall, 1996). However, some distance learning critics would argue that since learning resources are scarce, bringing in more students would dilute the

quality of these resources (Ehrmann). With advances in technology, these resources, e.g., books, communication facilities, and calculators, were mass produced, making them widely available to many learners simultaneously with enhanced quality. Today the computer has taken over as one of the most important, if not the most important, learning tool in accessing learning resources and enhancing learning at the same time. Online communication facilitates communicating with one another, transfer text/data files, obtaining information from computer databases, and transcending time and space constraints. Computer-mediated communication (CMC), or distributed learning environment, is a new medium in education and more specifically, distance education. The basic structural element of CMC is that all communications are stored on the system and are retrievable. Hence, this information is researchable and downloadable at any time. Its drawbacks include requiring access to expensive essential telecommunications facilities and equipment and familiarity with the technology itself. The interest is high in spite of these barriers because, like the spoken word, it is spontaneous and flexible. It is a powerful medium for communication and cooperative learning. Ehrmann cites four types of learner interaction achieved in a CMC.

Learners study instructive messages that are transmitted through the media. From the traditional lecture hall/textbook modality, access to these messages are enhanced with the new technologies, e.g., videotape, audiotape, desktop publishing, computer-mediated instruction, improved images, and dynamic displays.

The Stanford Online Project at the Stanford Center for Professional Development delivers engineering and computer science courses incorporating video with audio, text, and graphics in an on-demand capability.

Learners can take advantage of the tool's power and portability. The capabilities to analyze and solve problems are unlimited.

A host of universities require that all students own a computer. The Laptop program at Oklahoma University was implemented in the fall of 1996. This program was implemented based on the following reasons: the trend in engineering requiring a lot of computer usage; demand for more computing resources and services from the Engineering College Network (ECN), the increasing number of students already owning a computer, ECN capability of providing Internet access and engineering application software access, and the production of engineers with strong computer skills.

Connectivity with others, such as the faculty and fellow students, is achieved in real time. Traditional technologies of direct faculty-student and student-student contact is complemented by new technologies such as audioconferencing, text-based conferencing, and audiographics conferencing.

In the Stanford Online Project, students are able to asynchronously interact with the instructor and fellow students. Class videos are done in either QuickTime or Vxtreme format.

Time-delayed, conversation-based materials such as homework, projects, and assignments, are enhanced. New technologies, such as electronic transfer of files, asynchronous computer conferencing, and the fax, allow more frequent conversation

and a new rhythm for learning with a wider range of expression and exploration.

Possible predictors of success in using CMC in distance education depend on the teacher's interest and familiarity with the technology, trust in the value of cooperative learning, and sufficient time to assess student contributions. It also depends on the student's ability to overcome all techno-socio-economic barriers in achieving mastery of the medium.

Quality of Learning and Accreditation

Research and evaluation studies show that achievement and satisfaction of students who learn via teachnology can equal those of students in regular classrooms (Johnstone, 1996). There are various factors at play in that transfer of learning. Information transfer is one. A survey of 400 students in two-way telecourses between 1988 and 1990 revealed that the amount of information transferred was the best predictor of learning and the strongest predictor of satisfaction was information transfer (Walker, 1992).

Another factor linked to meaningful learning is interaction with faculty. This has been shown in several studies linking interaction with learning. An Oklahoma Televised Instruction System survey in 1992 showed that 83% interacted with the instructor all the time and did not feel disadvantaged when it came to access to services. The same study revealed that distance education students performed equivalently in civil engineering but performed better in business, humanities, science, and social science. The students cited that problems with the telecommunication system, instructor style, method of instruction, and lack of library resources hindered their performance. In a 1993 survey of 30 video-based distance education students in various courses at an independent university, course completion was directly correlated with faculty-initiated contact by telephone call to their students (Towles et al., 1993). A survey of teleconference DL students delivered by two Canadian universities revealed that the goals of deep learning and critical thinking were achieved when teleconference took place more frequently, such as on a weekly basis compared to a biweekly basis (Anderson, 1994).

Delivery mode is another factor that can have an effect on learning. A study was done of the same graduate class in management technology delivered in the traditional method at Georgia Institute of Technology and the University of Alabama at Hunstville and by studio broadcast to students enrolled at National Technological University (NTU) at Colorado. In that study, the traditional students outperformed the remote students on the examination calling for understanding and articulation of basic concepts. However, the older NTU students outperformed the traditional students on questions calling for application and synthesis of course materials.

Student's attitudes on the distance education mode can also have a significant impact on the quality of learning. A less positive reaction to the physical distance learning environment and to the overall course was expressed by students at Valdosta State University. At a large midwestern university (remote site), telecourse students were compared with (broadcast) traditional students. High grades for telecourse students were associated with greater expediency, greater self-sufficiency, and less compulsiveness. For traditional students, high grades were associated with greater conscientiousness, emotional stability, soberness, shyness, and liberalism. A

high rate of student retention and satisfaction with studies at the Open Polytechnic of New Zealand were attributed to students receiving a pre-enrollment counselling booklet.

Several factors can affect distance learners' satisfaction with interactive televised courses. A Ball State University survey revealed seven dimensions: Instructor/Instruction, Technology, Course Management, At-Site Personnel, Promptness of Material Delivery, Support Services, and Out-of-Class Communication With the Instructor.

Faculty attitude to distance education is mixed. A survey of faculty members in 57 public institutions revealed attitudes toward distance education. In general, faculty attitude was positive but became negative when it was applied to their own programs or courses. Experienced distance education practitioners and community college faculty had a greater overall positive attitude than faculty at four-year institutions. Faculty at four-year institutions expressed positive attitudes toward videoconferencing. In a 1994 evaluation of the seven Annenberg/CPB New Pathways to a Degree Learning Projects of seven institutions, faculty was of the opinion that mediated teaching was not comparable to a face-to-face environment.

While the efficacy of technology is becoming less of a question in distance education, the focus is being shifted to surrounding issues such as feelings of isolation of distance students who do not have any human contact with their instructors, how to provide effective advising and academic support services to distance students, and a guarantee of continued support to electronically delivered programs until the distance students complete their program.

The Western Cooperative for Educational Telecommunications at WICHE (the Western Interstate Commission for Higher Education) Principles of Good Practice came out of research on state policies governing interstate program delivery and on extensive reviews, discussions, and comments by WICHE. The Principles of Good Practice is endorsed by the boards of three regional accrediting bodies, the North Central Association of Colleges and Schools Commission on Institutions, the Junior College Division of the Western Association of Schools and Colleges, and the Southern Association of Schools and Colleges; the Colorado Commission of Higher Education; South Dakota Board of Regents; New Mexico Commission of Higher Education; the Montana University System; and the New Mexico Commission of Higher Education.

The Western Cooperative collaborates with the Western Governor's Association in assuring quality by recommending a shift in the focus of quality assessment away from the academic program and toward assessment of the learner. In this assessment the quality of the academic program will be judged by outcomes or the demonstrated competency of its graduates. The program's success in producing competent graduates should be made public because it will help students who are looking for quality programs.

The mission of the Florida Distance Learning Network is to improve student learning, achievement, and instructional techniques through increased access to distance learning in the most cost-effective way by:

- Maximized use of advanced telecommunication services based on applications needed for affordable distance education

- Interagency cooperation and partnerships

- Secured federal/private funds to support advanced telecommunications services and distance education

- Coordinated advanced telecommunications services and distance education services to maximize return on investment

Accreditation is a process that gives public recognition to educational institutions that meet published standards of quality. It is a fact that distance education is "becoming widely accepted but yet is still not mainstream and employers skeptical of a degree are likely to be even less accepting of one from an unaccredited school" (Non-traditional education, 1996, p. 22). Distance study accreditation through the Accrediting Commission of the Distance Education and Training Council provides distance education institutions with a single source of national recognition. The process of accreditation begins when a distance education institution that has been operational for two years submits an application for accreditation to the DETC offices. An in-depth self-evaluation report; a review of all courses by subject matter experts; a survey of students, graduates, state departments of education, federal agencies, Better Business Bureaus, and other official bodies; and an on-site inspection to verify information constitute the evaluation process. All reports are reviewed by the commission in conformity with all of DETC's educational and business standards. Once accredited, the institution must submit annual reports and be re-examined every five years. Accreditation is an important benchmark for educational quality (Johnstone, 1996). Of the 15 WICHE states, 12 require that only accredited institutions be granted approval to offer distance education within that state.

Quality assurance in distance learning is an important issue that is being addressed by higher education institutions and governing boards, state governments, and accrediting agencies. States can protect the education consumer by requiring educational providers to disclose their accreditation status. The traditional method used by the states to ensure quality is to require regulation and licensing for out-of-state institutions who wish to offer courses in their state. Licensing requirements are difficult in global electronic communication for two reasons: the location of the student studying at a distance is hard to predict and strict state licensing/regulation requirements can discourage quality institutions from offering courses. One example is the failed implementation of University of North Dakota's space program because of strict regulations in Washington. California and Idaho also have discouraged reputable distance education institutions because of their strict regulations.

At the Council on Postsecondary Accreditation (COPA) Professional Development Program on Distance Learning and Accreditation held in spring 1991, Steven Crow listed basic assumptions embodied in accreditation standards and criteria that may have direct implications on the way distance education is assessed:

- Accreditors try to locate distance learning within campus-based, traditional institutions offering traditional programs.

- Traditional institutions and programs have proven, documented means of showing educational effectiveness.

- The classroom faculty defines quality higher education.

Crow further expanded his argument by laying out three issues accreditors will have to deal with to respond creatively and responsibly to the rapidly changing distance learning technologies:

- New types of institutions will be shaped by new technologies.

- Consortial, shared, or purchased programs need to be dealt with appropriately.

- The disappearance of boundaries—program, institutional, political, and regional—will occur.

Conclusion

Technology has precipitated a new era of educational paradigm. Distance education faces an enormous challenge because it is an evolving field and is heavily dependent on a rapidly changing telecommunications industry. The standards by which educational quality of a distance-delivered course is measured is still based on norms set by the traditional university. If distance education will be judged through its own merits, then it needs to have its own set of criteria for evaluation, one not entirely based upon standards accorded the traditional university. When assessing the educational quality derived from a distance-delivered course, emphasis would need to be placed on the quality of its graduates and outcomes of the educational process, such as the skills and competencies acquired and validated in the workplace.

Table 1. List of Collaborative Agencies Offering Engineering Distance Learning and Member Universities

University	NTU	NUDC	SUCCEED	FEEDS
Arizona State University				
Boston University				
California State University Long Beach				
Clemson University				

Colorado State University
Columbia University
ECE at Carnegie Mellon University
Florida A&M University
Florida Atlantic University
Florida International University
Florida State University
George Washington University
Georgia Institute of Technology
GMI Engineering & Management Institute
Illinois Institute of Technology
Iowa State University
Kansas State University
Lehigh State University
Michigan State University
New Jersey Institute of Technology
New Mexico State University
North Carolina A&M State University
North Carolina State University
Northeastern University
Oklahoma State University
Old Dominion University
Purdue University
Rennselaer Polytechnic University

Southern Methodist University
University of Alabama, Huntsville
Utah State University
The University of Alabama
University of Alaska, Fairbanks
University of Arizona
University of Arkansas
University of California, Berkeley
University of California, Davis
University of Central Florida
University of Colorado, Boulder
University of Delaware
University of Florida
University of Idaho
University of Illinois Urbana-Champaign
University of Kentucky
University of Maryland at College Park
University of Massachusetts, Amherst
The University of Michigan
University of Minnesota
University of Missouri—Rolla
University of New Mexico
University of New Orleans
University of North Carolina Charlotte

University of North Florida
University of Notre Dame
University of Oklahoma
University of South Carolina
University of South Florida
The University of Tennessee Knoxville
University of Washington
University of West Florida
University of Wisconsin—Madison
University of Wyoming
Virginia Polytechnic Institute
Washington State University

Table 2. Worldwide Distance Learning Universities in Engineering

Source: British Open University, International Center for Distance Learning Database

University of South Pacific/Fiji	Swindon College/United Kingdom
Charles Sturt University/Australia	Edinburgh's Telford College/United Kingdom
Deakin University/Australia	University of Bath/United Kingdom
Engineering Education Australia/Australia	University of Paisley/United Kingdom
Open Training and Education Network/Australia	Granton Institute of Technology/Canada
Professional/Graduate/Educ Consort/Australia	Sault College of Applied Arts and Technology/Canada
TAFE External Studies College/Australia	Southern Alberta Institute of Technology/Canada
University of New England/Australia	St. Lawrence College/Canada
Monash University	British Columbia Institute of Technology/Canada

University of Southern Queensland/Australia	Confederation College of Applied Arts and Tech/Canada
Open Learning Institute of TAFE/Australia	Fanshawe College/Canada
CentroParaLa InnovationYDesarollodeLaEduc/Spain	Granton Institute of Technology/Canada
Angus College/United Kingdom	University of Waterloo/Canada
Bradford and Ikley Community College/United Kingdom	Birla Institute of Technology and Science/India
Cleveland Open Learning Unit/United Kingdom	Indira Gandhi National Open University/India
Henley College Coventry/United Kingdom	Lyceum College/South Africa
Inverness College/United Kingdom	Rapid Results College/South Africa
National Extension College/United Kingdom	College of South Africa/South Africa
Open College/United Kingdom	British Tutorial College/Tanzania
Open Learning in Scotland/United Kingdom	Central African Correspondence College/Zimbabwe
Plymouth College of Further Education/United Kingdom	Organizational Training and Development/Zimbabwe
Sandwell College/United Kingdom	Open University of Sri Lanka/Sri Lanka

Table 3. Undergraduate Distance Learning Universities in the United States

Source: Peterson's Directory

Arizona State College	San Diego City College
Butte College	University of California, Extension
Carlton University	University of Dayton, www.udayton.edu
Castle College	University of Idaho, www.idaho.edu
Hibbing Community College	University of Maryland—College Park, www.umd.edu
Howard Community College	University of Minnesota—Twin Cities Campus, www.umn.edu
Lakeshore Technical College	University of Missouri—Columbia, www.system.missouri.edu
Medical University of South Carolina	University of Nebraska—Lincoln, www.unl.edu
North Carolina State University, www.ncsu.edu	University of New Hampshire—Durham, www.unh.edu
Northern Virginia Community College	University of Oklahoma, www.uoknor.edu
Pennsylvania State University, www.psu.edu	University of South Carolina—Union
University Park Campus	University of Wisconsin—Eau Claire, www.uwec.edu
Rochester Institute of Technology, www.rit.edu	

Table 4. Engineering Distance Learning and Member Universities

Arizona State University	University of Arkansas
Colorado State University	University of California, Berkeley
Columbia University	University of California, Davis
ECE at Carnegie Mellon University	University of Central Florida
Florida Atlantic University	University of Colorado, Boulder
Florida International University	University of Delaware
Florida State University	University of Florida
George Washington University	University of Idaho
Georgia Institute of Technology	University of Illinois Urbana Champaign

GMI Engineering & Management Institute	University of Kentucky
Illinois Institute of Technology	University of Maryland at College Park
Iowa State University	University of Massachusetts, Amherst
Kansas State University	University of Michigan
Lehigh State University	University of Minnesota
Michigan State University	University of Missouri—Rolla
New Jersey Institute of Technology	University of New Mexico
New Mexico State University	University of New Orleans
North Carolina A&M State University	University of North Carolina Charlotte
North Carolina State University	University of North Florida
Northeastern University	University of Notre Dame
Oklahoma State University	University of Oklahoma
Old Dominion University	University of South Carolina
Purdue University	University of South Florida
Rennselaer Polytechnic University	University of Tennessee Knoxville
Southern Methodist University	University of Washington
University of Alabama, Huntsville	University of West Florida
Utah State University	University of Wisconsin—Madison
University of Alabama	University of Wyoming
University of Alaska, Fairbanks	Virginia Polytechnic Institute
University of Arizona	Washington State University

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